



**XANTREX**

*Smart Choice For Power*

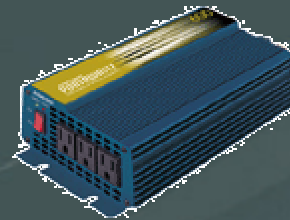
**Ray Hudson**



**Vice President - Emerging Markets  
and Advanced Development**

# Who is Xantrex?

- ◆ Industry leading advanced power electronics company, with revenues of over \$100 million and 700 employees
- ◆ Products ranging from 50 watt consumer electronics to 1 megawatt systems used in utility-scale renewable energy applications
- ◆ Markets
  - ◆ Test and Measurement
  - ◆ Mobile and Portable
  - ◆ Distributed Power
    - ◆ Residential and Commercial
    - ◆ Industrial and Utility



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# Company History

- ◆ Xantrex was founded in 1983
- ◆ A series of mergers and acquisitions in 1999 and 2000, combined respected power electronics brands in the consumer, mobile, renewable energy and test & measurement markets

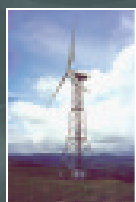
A large, thick blue circular arrow surrounds the Xantrex logo. The arrow starts at the top, curves around the right, and ends at the bottom, pointing back to the start.

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# Utility Interconnect Products

Distributed Resource



Wind



Solar



Fuel Cell



Microturbine



Advanced Battery

Power Electronics Converter



Utility Distribution Grid

Presently over 2,000MW  
of installed grid  
connected equipment  
controlled by Xantrex  
converters

- Interconnect standards met by converter hardware and software
- IEEE 519, UL 1741, IEEE 929, IEEE P1547

# *Solar - Industrial and Utility Products*

- ◆ PV - Series

- ◆ 10kW to 20kW
- ◆ Three Phase
- ◆ Grid tied only
- ◆ UL 1741 Listed



- ◆ PV - Custom

- ◆ 30kW to 500kW
- ◆ Three Phase
- ◆ Grid tied only
- ◆ Not yet UL 1741
- ◆ Customer specific requirements





# Solar - Residential and Commercial Products

- ◆ ST Series

- ◆ Grid tied only
- ◆ 1kW to 2.5kW
- ◆ Single Phase
- ◆ UL 1741 Listed



- ◆ SW Series

- ◆ Grid tied and backup power
- ◆ 1kW to 5.5kW
- ◆ Single Phase
- ◆ UL 1741 Listed
- ◆ Battery connection for energy storage



# Wind Products

- ◆ Utility Scale
  - ◆ Customer Specific Requirements
  - ◆ 400kW to 1.5MW
  - ◆ Installed in large Windplants
    - ◆ Interconnect similar to central generation
  - ◆ IEEE 519
  - ◆ Controllable Reactive Power
    - ◆ Static
    - ◆ Dynamic
- ◆ Commercial/Residential
  - ◆ 10kW
  - ◆ Single Phase
  - ◆ UL 1741



# *Emerging Markets Products/Projects*

- ♦ Customer Specific Projects
  - ♦ Fuel Cell
  - ♦ Microturbine
  - ♦ Flywheel
  - ♦ Advanced Batteries
- ♦ Customer specific grid interconnect requirements
  - ♦ Typically IEEE 519 (or more stringent)
  - ♦ Some elements of IEEE 929, UL 1741, and IEEE P1547
  - ♦ Leverage from other projects/products
  - ♦ Pursue certification and new standards as products and markets mature





# *Xantrex Grid Interconnect Approach*

- ◆ Power Electronics Converter implements protective relaying standards in addition to controlling DER device
  - ◆ IEEE - 519
  - ◆ IEEE - 929
  - ◆ UL - 508
  - ◆ UL - 1741
  - ◆ IEEE - P1547 (Xantrex is closely tracking progress)
  - ◆ State requirements (CA, NY, TX ...)
  - ◆ Customer specific requirements
  - ◆ Use as product differentiator
  - ◆ International requirements
    - ◆ European countries
    - ◆ Australia
    - ◆ Japan

# *Advantages of Integrated Implementation*

- ◆ Converter required as part of system
- ◆ Improved protection by integrating control and protection
- ◆ Lower system cost
  - ◆ eliminating requirement for additional components
  - ◆ Utilizes converter control sensors
  - ◆ Utilizes converter disconnects
  - ◆ Utilizes existing control microprocessor (DSP)
- ◆ Higher reliability through reduced number of components
- ◆ Flexibility through software implementation
  - ◆ Ability to implement new requirements
  - ◆ Ability to adjust parameters easily

# *Additional Features Implemented*

- ♦ Metering
- ♦ Data gathering
- ♦ Event logging
- ♦ System test features
  - ♦ Manual
  - ♦ Automatic
- ♦ Communications
  - ♦ Serial / Modem
  - ♦ CAN
  - ♦ Discrete
  - ♦ Analog
  - ♦ Internet
- ♦ Remote Control



# *Xantrex View on Interconnect Standards*

- ◆ Broadly accepted standards
  - ◆ Among utilities
  - ◆ By regulators
  - ◆ By policy developers
  - ◆ By end users
  - ◆ International acceptance desirable
- ◆ Reasonable standards
  - ◆ Not add excessive system installed cost
  - ◆ Not add significant system operational costs
- ◆ Test methods developed as part of standard
- ◆ Meaningful certification
- ◆ “Plug and Play” is goal

# *Xantrex Future Plans*

- ◆ Future US products will implement new standards as they are adopted and accepted (like IEEE P1547)
- ◆ Continue to expand product line
  - ◆ Grid tied solar (PV 30kW - 100kW next)
  - ◆ Home backup power
  - ◆ Wind
  - ◆ Emerging markets applications
- ◆ Expansion of international products